

PALS Helpful Hints and Exam Review 2020 Guidelines July 2022

The PALS Provider or Renewal course is a comprehensive program that covers the 2020 guidelines for Pediatric Advanced Life Support. Knowledge of basic cardiac dysrhythmias is required. The PALS exam is 50 questions. Rhythm recognition is required for several of these questions. The exam passing score is 84% or you may miss 8 questions. Remediation is allowed. The exam is open resource (book, notes).

Book Required before the class: Purchase at shopcpr.heart.org 2020 Guidelines PALS Provider Manual

- PALS Provider Manual eBook Product number 20-3120 or
- PALS Provider Manual (Paper version) Product Number: 20-1119

Pals Precourse Self-Assessment and Pre-Course Work Required before the class (no charge) 70% to Pass

American Heart Association link is elearning.heart.org/courses. **Precourse Self-Assessment and Pre-Course Work (no charge). In search bar put in code 1487**

Complete this assessment and pre-course work prior to taking the course. Dysrhythmia knowledge is required as strip recognition is required.

The course is a series of video segments (viewed on Pre-course work then skills. The course materials well prepare you for the exam.

Basic Dysrhythmias knowledge is required in relation to asystole, ventricular fibrillation, tachycardias in general and bradycardias in general. You do not need to know the ins and outs of each and every one. Tachycardias need to differentiate wide complex (ventricular tachycardia) and narrow complex (supraventricular tachycardia or SVT).

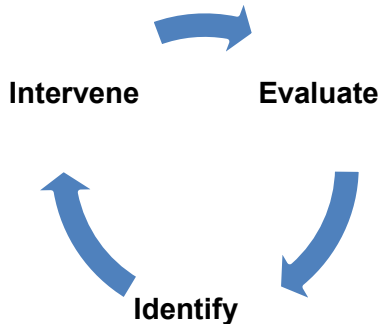
- Airway - child is grunting - immediate intervention.
- Airway - deteriorates after oral airway, next provide bag-mask ventilation
- Airway - snoring with poor air entry bilaterally - reposition, oral airway
- AVPU - findings normal - rated as Alert
- CPR - 1 rescuer. 30:2 compression to ventilation ratio. 2 person 15:2 compression to ventilation
- CPR - after defibrillation resume compressions
- CPR - high quality component - allow complete chest wall recoil after each compression
- CPR - simultaneous pulse and breathing check no more than 10 seconds.
- CPR - you are alone with infant - Begin CPR for 2 minutes then leave to activate emergency response.
- Defibrillation - initial for 20 kg child - 40 J, with pulseless VT, VF 2 to 4 J/kg
- Fluid resuscitation - 10-20 ml/kg over 5 to 10 minutes (10 for neonates)
- I/O before vascular access - for cardiac arrest, an extremity with slow capillary refill time
- Labs - lethargy, Polyuria, onset rapid, deep, labored breathing - assess blood glucose
- Motor vehicle accident, immediate intervention for decreased level of consciousness.
- Oxygen sat - below 90 while on oxygen - immediate intervention, - ideal 94% to 99% (not 94% to 100%)
- Respiratory - distress - audible inspiratory stridor.
- Respiratory - failure - lethargic, rapid respiratory rate, tachycardic, most indicative of a low oxygen saturation.
- Respiratory - failure with fever, antibiotic is the most appropriate medication.
- Respiratory - lower airway - wheezing
- Respiratory - seizures, slow respirations - disordered control of breathing.
- Respiratory - unresponsive, respirations 6 per minute - provide bag-mask ventilation with 100% O₂.
- Respiratory - upper airway - increased work of breathing, inspiratory effort with retractions, stridor, nut allergy.
- Respiratory - upper airway obstruction drug - nebulized epinephrine.
- Respiratory - distress from lung tissue disease - crackles.
- Rhythm - bradycardia, no pulse - pulseless electrical activity
- Rhythm - hypoxia most likely cause of bradycardia in an infant.
- Rhythm - pulse above 180 Narrow complex, regular - Supraventricular tachycardia.
- Rhythm - rate slow, sinus bradycardia.
- Rhythm - Supraventricular tachycardia, hypotensive - synchronized cardioversion.
- Shock - distributive, septic - fever, lactic acidosis, antibiotic as an early intervention.
- Shock - fever, hypotensive - IV 10 - 20 mL/kg of isotonic crystalloid over 5 to 10 minutes.
- Shock - hypotensive - best assessment variable is blood pressure, 55/40 for 2-week-old.
- Shock - hypovolemic - history vomiting, diarrhea
- Shock - severity, compensated or not is determined by the blood pressure, not other variables.
- Team dynamics - out of scope: team member should ask for a new task or role.
- Team dynamics - wrong dose by team leader, respond "I think the correct dose is.... should I give instead?"
- Vital Signs - Heart rate 88 is normal for a 10-year-old, respiratory rate 24 normal for 3 year old.
- Vomiting, diarrhea assess blood glucose first

Systematic Approach Algorithm

Initial Assessment

- **Appearance**
- **Work of Breathing**
- **Circulation (color)**

Evaluate – Identify - Intervene



A continuous sequence.
Determine if problem is life threatening.

EVALUATE

PRIMARY ASSESSMENT

- **Airway** – Patency, Open airway
- **Breathing** – Breath Sounds
- **Circulation** – Heart Rate, Skin
- **Disability** - Level of Consciousness
 - AVPU - alert, voice, painful, unresponsive
 - Glasgow Coma Scale, Pupils
 - Blood glucose
- **Exposure** - Temperature

SECONDARY ASSESSMENT

6 Hs 5 Ts -Search for Reversible Causes

H's	T's
H ypovolemia	T ension pneumothorax
H ypoxia	T amponade, cardiac
H ydrogen ion (acidosis)	T oxins – poisons, drugs
H ypoglycemia	T hrombosis – coronary (AMI)
H ypo /hyper kalemia	T hrombosis – pulmonary (PE)
H ypothermia	

- ♥ **Focused medical history**
- ♥ **Focused physical exam**
- ♥ **Ongoing reassessment**
 - S**- Signs & symptoms (What hurts?)
 - A**- Allergies
 - M**- Medications
 - P**- Past medical history
 - L**- Last meal
 - E**- Events Preceding, what happened

DIAGNOSTIC ASSESSMENT

- ABG, Venous blood gas, arterial lactate
- Central venous O₂ saturation, CVP
- CXR, ECG, Echo
- Peak expiratory flow rate

IDENTIFY

- **Type and Severity of Potential Problems**

Respiratory	Circulatory
Respiratory Distress Or Respiratory Failure	Compensated Shock Or Hypotensive Shock
Upper airway obstruction Lower airway obstruction Lung tissue disease Disordered control of breathing	Hypovolemic shock Distributive shock Cardiogenic shock Obstructive shock

Cardiopulmonary Failure Cardiac Arrest

INTERVENE

- Positioning the child to maintain a patent airway
- Activating emergency response
- Starting CPR
- Obtaining the code cart and monitor
- Placing the child on a cardiac monitor and pulse oximeter
- Administering O₂
- Supporting ventilation
- Starting medications and fluids using nebulizer, IV/IO fluid bolus

An intubated patient's condition deteriorates; consider the following possibilities (DOPE):

- **D**isplacement of the tube from the trachea
- **O**bstuction of the tube
- **P**neumothorax
- **E**quipment failure

Vital Signs in Children - Normal Ranges

Age	Systolic BP	Pulse (awake)	Respirations
Neonate	67-84	100-205	
Infant	72-104	100-190	30-53
Toddler	86-106	98-140	22-37
Preschooler	89-112	80-120	20-28
School-aged	97-115	75-118	18-25
Adolescent	110-131	60-100	12-20

Treatment of Dysrhythmias - general overview. See book for details

Bradycardia

- ♥ Maintain patent airway, assist breathing positive pressure ventilation, O₂ if needed, monitor
- ♥ ABCs, consider oxygen, observe, 12 lead, identify and treat underlying causes
- ♥ Bradycardia persists: IV/IO, Epinephrine 0.01 mg/kg, Atropine 0.02 mg/kg may repeat 1x, consider pacing, treat underlying causes
- ♥ Continuous CPR if heart rate below 60

Tachycardia with a Pulse

- ♥ Maintain patent airway, assist breathing as necessary, oxygen, monitor, pulse, BP, oximetry
- ♥ Sinus tach – treatable causes, rhythm in infants/children may be slightly regular or irregular
- ♥ SVT – asymptomatic consider vagal maneuvers and give adenosine if IV/IO present
- ♥ SVT – rhythm regular - infant rate above 220, child above 180 SVT - adenosine 0.1 mg/kg rapid bolus (max 6 mg), repeat 0.2 mg/kg rapid bolus (max 12 mg)
- ♥ No IV/IO, adenosine not successful, cardioversion
- ♥ QRS wide? - Probable V tach - 12 lead, adenosine as above, synchronized cardioversion 0.5 to 1 J/kg then 2 J/kg. Sedate if needed. Don't delay cardioversion

Pediatric Cardiac Arrest - H's T's

- CPR – If no advanced airway 15:2 compression to ventilation. If advanced airway breath every 2 – 3 seconds, bag/mask, O₂, monitor/defib
- Shockable (VF/VT) – CPR 2 min,
 - shock 2 J/kg, then 4 J/kg to max of 10 or adult dose
 - epinephrine 0.01 mg/kg repeat 3 to 5 min (max 1 mg)
 - Amiodarone 5mg/kg repeat up to 3 times or lidocaine 1 mg/kg
- Non-shockable (asystole/pea) – CPR 2 minutes
 - Epinephrine ASAP epinephrine 0.01 mg/kg repeat 3 to 5 min (max 1 mg)
 - Treat reversible causes

Respiratory - see PALS text for full details

Managing Respiratory Emergencies Flowchart		
<ul style="list-style-type: none"> • Airway positioning • Suction as needed 	<ul style="list-style-type: none"> • Oxygen • Pulse Oximetry 	<ul style="list-style-type: none"> • ECG as Indicated • BLS as indicated
Upper Airway	Croup	<ul style="list-style-type: none"> ▪ Nebulized epinephrine ▪ Corticosteroids
	Anaphylaxis	<ul style="list-style-type: none"> ▪ IM epinephrine (or autoinjector) ▪ Albuterol ▪ Antihistamines ▪ Corticosteroids
	Aspiration Foreign Body	<ul style="list-style-type: none"> ▪ Allow position of comfort ▪ Specialty consultation
Lower Airway Obstruction	Bronchiolitis	<ul style="list-style-type: none"> ▪ Nasal Suctioning ▪ Consider bronchodilator trial
	Asthma	<ul style="list-style-type: none"> ▪ Albuterol + ipratropium ▪ Corticosteroids ▪ Magnesium sulfate ▪ IM epinephrine (if severe) ▪ Terbutaline
Lung Tissue Disease	Pneumonia/pneumonitis Infectious Chemical Aspiration	<ul style="list-style-type: none"> ▪ Albuterol ▪ Antibiotics (if indicated) ▪ Consider noninvasive or invasive ventilatory support with PEEP
	Pulmonary edema Cardiogenic or noncardiogenic (ARDS)	<ul style="list-style-type: none"> ▪ Consider noninvasive or invasive ventilatory support with PEEP ▪ Consider vasoactive support ▪ Consider diuretic
Disordered Control of Breathing	Increased ICP	<u>Avoid:</u> <ul style="list-style-type: none"> ▪ Hypoxemia ▪ Hypercarbia ▪ Hyperthermia ▪ Hypotension
	Poisoning/Overdose	<ul style="list-style-type: none"> ▪ Antidote (if available) ▪ Contact poison control
	Neuromuscular disease	<ul style="list-style-type: none"> ▪ Consider noninvasive or invasive ventilatory support

Shock - see PALS text for full details

Managing Shock Flowchart		
	<ul style="list-style-type: none"> • Oxygen • Pulse Oximetry 	<ul style="list-style-type: none"> • ECG Monitor • IV/IO access • BLS as indicated • Point of care glucose testing
Hypovolemic Shock	Nonhemorrhagic	<ul style="list-style-type: none"> ▪ 20 ml/kg NS/LR bolus, repeat as needed ▪ Consider Colloid
	Hemorrhagic	<ul style="list-style-type: none"> ▪ Control external bleeding ▪ 20ml/kg NS/LR bolus, repeat 2 or 3x as needed ▪ Transfuse PRBC's as needed
Distributive Shock	Septic	<ul style="list-style-type: none"> ▪ See Septic Shock Algorithm <ul style="list-style-type: none"> ○ Support ABCs ○ HR, BP, Pulse Oximetry, IV/IO ○ 10 – 20 ml/kg isotonic crystalloid bolus (assess). Stop if resp distress, hepatomegaly ○ Blood culture, lab studies, glucose ○ Broad spectrum antibiotics (After cultures) ○ Antipyretics if needed
	Anaphylactic	<ul style="list-style-type: none"> ▪ IM epinephrine (or autoinjector) ▪ Fluid bolus (10 – 20 ml/kg NS/LR) ▪ Albuterol, Antihistamines, Corticosteroids ▪ Epinephrine infusion
Cardiogenic Shock	Bradycardia Tachycardia	<ul style="list-style-type: none"> ▪ Management algorithms
	Other: CHD, myocarditis, cardiomyopathy, poisoning	<ul style="list-style-type: none"> ▪ 5 – 10 ml/kg NS/LR bolus, repeat PRN ▪ Inotropic and/or vasoactive infusions ▪ Consider expert consultation ▪ Antidote for poisoning
Obstructive Shock	Ductal-dependent (LV outflow obstruction)	<ul style="list-style-type: none"> ▪ Prostaglandin E1 ▪ Expert consultation
	Tension Pneumothorax	<ul style="list-style-type: none"> ▪ Needle decompression ▪ Tube thoracostomy
	Cardiac tamponade	<ul style="list-style-type: none"> ▪ Pericardiocentesis ▪ 20 m/kg NS/LR bolus
	Pulmonary embolism	<ul style="list-style-type: none"> ▪ 20 ml/kg NS/LR bolus, repeat PRN ▪ Consider thrombolytics, anticoagulants ▪ Expert consultation

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Signs of compensated shock include (poor perfusion, NORMAL systolic BP)

- Tachycardia
- Increased SVR
 - Skin - cold, pale, mottled, diaphoretic
 - Peripheral circulation - delayed capillary refill
 - Pulses - weak peripheral pulses, narrowed pulse pressure
- Increases renal and splanchnic vascular resistance (redistribution of blood flow)
 - Kidney - decreased urine output, oliguria
 - Intestine - vomiting, ileus
- Cerebral auto regulation - brain, altered mental status, anxiety, coma
- **Normal blood pressure**

Signs of decompensated shock include

As compensatory mechanisms fail, signs of inadequate end-organ perfusion develop. In addition to the above, these signs include

- Depressed mental status, decreased urine output
- Metabolic acidosis, Tachypnea, Weak central pulses
- **Hypotension**

The most common cause of shock is hypovolemia, one form of which is hemorrhagic shock. Distributive and cardiogenic shock are seen less often.

- Capillary refill time alone is not a good indicator of circulatory volume, but a capillary refill time of >2 seconds is a useful indicator of moderate dehydration when combined with a decreased urine output, absent tears, dry mucous membranes, and a generally ill appearance.
- Tachycardia also results from other causes (e.g., pain, anxiety, fever).
- Pulses may be bounding in anaphylactic, neurogenic, and septic shock.

In compensated shock, blood pressure remains normal; it is low in decompensated shock. Hypotension is a *systolic* blood pressure less than the 5th percentile of normal for age.

Pediatric Cardiac Arrest Medications

Medication	Dose	Remarks
Epinephrine	Pulseless arrest, symptomatic bradycardia 0.01 mg/kg IV/IO q 3 to 5 min Symptomatic Brady – 0.01 mg/kg	Doses vary for other conditions and situations
Atropine	Bradycardia - 0.02 mg/kg IV/IO q 3 to 5 min 0.04 to 0.06 mg/kg ET	Child max 1 mg total dose Adolescent max 3 mg total dose
Adenosine	SVT 0.1 mg/kg IV/IO rapid push max 6 mg Repeat 0.2 mg/kg max 12	Rapid push closest port followed by fluid bolus 5-10 ml NS
Amiodarone	SVT, VT with pulse 5 mg/kg IV/IO Pulseless arrest 5 mg/kg IV/IO Total 15 mg/kg, max single dose 300 mg	load over 20-60 min may produce prolonged QT
Naloxone	0.1 mg/kg IV/IO/IM bolus q 2 min	max 2 mg ½ life is short, repeated dosing May wake up agitated
Lidocaine	VF/ Pulseless VT 1 mg/kg IV/IO bolus. 2 to 3 mg/kg ET	Maintain 20 to 50 mcg/kg/min
Dextrose Glucose	0.5 to 1 g/kg IV/IO	Use bedside glucose check to confirm hypoglycemia
Magnesium Sulfate	Asthma refractory 25 to 50 mg/kg IV/IO Pulseless V-tach Torsades 25 – 50 mg/kg	Max 2 G May cause bradycardia